Heating Cost Worksheet

ıe first step in figuring out how much money can be saved by switching to another system to estimate how much you currently spend on heating your home. Ask your utility for elp breaking out heating costs from other appliances used in the house.

Then do the following calculations to estimate how much money can be saved each year r upgrading or switching the heating system. The examples shown here are for illustration nly. Use your own energy bills and rates to estimate savings for your house.

Upgrading Equipment Using the Same Energy Source

you are staying with the same energy source and wish to determine how much you can ve by upgrading the equipment to a higher seasonal efficiency, use Equation 1.

Equation 1:

$$\text{Annual Savings} = \frac{(A - B)}{A} \times C$$

where A = Seasonal efficiency of new (or upgraded) equipment
B = Seasonal efficiency of existing equipment
C = Annual heating cost

XAMPLE 1: OIL

ow much would a homeowner save by changing from an existing conventional oil furnace ith a cast iron head burner to a new mid-efficiency oil furnace with a high static burner, her present annual oil heating bill is $935?

A = Seasonal efficiency of mid-efficiency oil furnace = 86% (0.86) (from Table 2)
B = Seasonal efficiency of existing conventional oil furnace = 60% (0.60) (from Table 2)
C = Annual heating cost = $935

se *Equation 1:*

$$\text{Annual savings} = \frac{(0.86 - 0.60)}{0.86} \times \$935 = \mathbf{\$283}$$

ıus she would save about $280 on fuel each year if she upgraded to a mid-efficiency oil rnace.

XAMPLE 2: NATURAL GAS

a house is heated with a conventional natural draft gas furnace and has a gas heating ll of $890 per year, how much would the homeowner save by going to a high efficiency as furnace with a seasonal efficiency (AFUE) of 96%?

A = Seasonal efficiency of condensing furnace = 96% (0.96) (from Table 2)
B = Seasonal efficiency of conventional furnace = 60% (0.60) (from Table 2)
C = Annual heating cost = $890

se *Equation 1:*

$$\text{Annual savings} = \frac{(0.96 - 0.60)}{0.96} \times \$890 = \mathbf{\$334}$$

XAMPLE 3: ELECTRICITY

a house heated with baseboard electric heat, with an annual heating bill of $1,500, how uch would a homeowner save by installing an air source heat pump with a seasonal coefcient of performance (COP) for his region of 1.4?

= Seasonal efficiency of new heat pump = 1.4
= Seasonal efficiency of existing baseboard = 100% (1) (from Table 2)
= Annual heating cost = $1,500

se *Equation 1:*

$$\text{Annual savings} = \frac{(1.4 - 1)}{1.4} \times \$1{,}500 = \mathbf{\$429}$$

witching Fuels

's a bit more complicated to determine whether switching fuels is a good investment. One ay is to use past energy bills to estimate how much heat your house requires. Determine ıe Annual Heating Load of your house by using Equation 2.

Equation 2:

$$\text{Annual heating load with existing equip.} = \frac{\text{Energy content}}{\text{Energy cost/unit}} \times \text{Seasonal efficiency} \times \text{Annual heating cost}$$

With this estimated annual heating load, you can determine how much it would cost to provide the same amount of heat to your house with a different energy source or different equipment using Equation 3.

Equation 3:

$$\text{Annual heating cost with new equipment} = \frac{\text{Energy cost/unit}}{\text{Energy content}} \times \frac{\text{Annual heating load}}{\text{Seasonal efficiency}}$$

EXAMPLE 4: NATURAL GAS TO GROUND SOURCE HEAT PUMP

Take a house which has a conventional gas furnace with an annual heating cost of $500, with a gas cost of $4 per thousand cubic feet.

Step 1: Determine heating load with existing equipment
Energy content (gas) = 1,007,000 Btu/1,000 ft^3 (From Table 1)
Seasonal efficiency (exist) = 0.60 (60%) (From Table 2)
Energy cost/unit (gas) = \$4/1,000 ft^3
Current Annual heating cost = $500

Use Equation 2:

$$\text{Annual heating load with exist. equip.} = \frac{1{,}007{,}000}{4} \times 0.60 \times 500 = \mathbf{75{,}525{,}000\ Btu}$$

The homeowner wants to determine whether it would save on energy costs to convert to a ground source (earth energy) heat pump with a coefficient of performance (COP) of 2.6. Electricity costs 7 cents ($0.07) per kWh.

Step 2: Converting to ground source heat pump
Heating cost/unit (elect.) = $0.07/kWh
Energy content (elect.) = 3,413 Btu/kWh (from Table 1)
Annual heating load = 75,525,000 Btu (from Step 1)
Seasonal efficiency (new) = 2.6 COP

Use Equation 3:

$$\text{Annual heating cost with new equip.} = \frac{0.07}{3{,}413} \times \frac{75{,}525{,}000}{2.6} = \mathbf{\$596}$$

Therefore, in this case, the homeowner would pay more each year to heat the home with the heat pump ($596) than to keep the existing system ($500).

EXAMPLE 5: BASEBOARD ELECTRIC TO OIL OR PROPANE

Take a large house heated with electric baseboard heating, which has an annual heating bill of $2,500. Electricity costs 8.5¢/kWh.

Step 1: Determine heating load with existing equipment
Energy content (elect.) = 3,413 Btu/kWh (from Table 1)
Seasonal efficiency (exist.) = 1 (100%) (from Table 2)
Energy cost/unit (elect.) = $0.085/kWh
Current Annual heating cost = $2,500

Use Equation 2:

$$\text{Annual heating load with existing equip.} = \frac{3{,}413}{0.085} \times 1 \times 2{,}500 = \mathbf{100{,}382{,}000\ Btu}$$

Would it be more economical to convert the house to be heated by a mid-efficiency oil furnace (if oil costs 94¢ per gallon) or to propane using a high-efficiency condensing furnace (if propane costs 99¢ per gallon)?

Step 2a: Converting to oil
Heating cost/unit (oil) = $0.94/gallon
Energy content (oil) = 140,000 Btu/gallon (from Table 1)
Annual htg load = 100,382,000 Btu/year (from Step 1)
Seasonal efficiency (new) = 0.86 (86%)

Use Equation 3:

$$\text{Annual heating cost with oil equip.} = \frac{0.94}{140{,}000} \times \frac{100{,}382{,}000}{0.86} = \mathbf{\$784}$$

Step 2b: Converting to propane
Heating cost/unit (propane) = $0.99/gallon
Energy content (propane) = 92,700 Btu/gallon (from Table 1)
Annual htg load = 100,382,000 Btu/year (from Step 1)
Seasonal efficiency (new) = 0.94 (94%) (from Table 2)

Use Equation 3:

$$\text{Annual heating cost with propane equip.} = \frac{0.99}{92{,}700} \times \frac{100{,}382{,}000}{0.94} = \mathbf{\$1{,}141}$$

Thus, in this case, it would be $357 cheaper to heat this house with oil than with propane ($1,141 – $784). Compared to the original electric baseboard heating, the residents would save about $1,700 per year by converting to a mid-efficiency oil furnace.

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